

What is claimed is:

- 1 1. A method for creating a computer model of diabetes, comprising:
2 identifying data relating to diabetes, the data relating changes in biological states to
3 biological attributes of diabetes;
4 identifying a plurality of biological processes related to the data, the plurality of
5 biological processes defining at least one portion of the disease state of diabetes; and
6 combining the plurality of biological processes to form a simulation of glucose
7 metabolism in the context of multiple macronutrient metabolism.
- 1 2. The method of claim 1, further comprising:
2 producing a simulated biological attribute associated with at least one biological
3 attribute of diabetes from the combined plurality of biology processes based on the
4 combined plurality of biology processes;
5 comparing the simulated biological attribute with a corresponding biological
6 attribute associated with a reference pattern of diabetes; and
7 identifying the computer model as a valid computer model of diabetes if the
8 simulated biological attribute is substantially consistent with the biological attribute
9 associated with a reference pattern of diabetes.
- 1 3. The method of claim 1, wherein the combining the plurality of biological processes
2 includes:
3 forming a first mathematical relation among biological variables associated with a
4 first biological process from the plurality of biological processes; and
5 forming a second mathematical relation among biological variables associated with
6 the first biological process and a second biological process from the plurality of biological
7 variables associated with the plurality of biological processes.
- 1 4. The method of claim 3, further comprising:
2 creating a set of parametric changes in the first mathematical relation and the
3 second mathematical relation; and

4 producing a simulated biological attribute based on at least one parametric change
5 from the set of parametric changes, the simulated biological attribute being substantially
6 consistent with at least one biological attribute associated with a reference pattern of
7 diabetes.

1 5. The method of claim 3, further comprising:
2 creating a set of parametric changes in the first mathematical relation and a set of
3 parametric changes in the second mathematical relation, the set of parametric changes in
4 the first mathematical relation being associated with a first diabetes defect having its own
5 degree of severity, the set of parametric changes in the second mathematical relation being
6 associated with a second diabetes defect having its own degree of severity.

1 6. The method of claim 3, further comprising
2 converting at least one biological variable from the group of the first mathematical
3 relation or second mathematical relation into a biological variable that evolves over time ;
4 and
5 producing a series of simulated biological attributes based on the converted
6 biological variable, the series of simulated biological attributes being substantially
7 consistent with a corresponding biological attribute associated with a reference pattern of
8 diabetes, the series of simulated biological attributes representing the disease progression
9 in the reference pattern of diabetes.

1 7. A computer model of a disease state of diabetes, comprising:
2 a computer-readable memory storing:
3 instructions defining a set of biological processes related to the
4 disease state of diabetes, at least two biological processes from the set of
5 biological processes being associated with a set of mathematical
6 relationships related to interactions among biological variables associated
7 with the biological processes, the instructions defining a simulation of
8 glucose metabolism in the context of multiple macronutrient metabolism;
9 and

10 a processor coupled to the computer-readable memory, the processor configured to
11 execute the instructions.

1 8. The computer model of claim 7, wherein, upon execution of the instruction, the
2 processor is configured to produce a simulated biological attribute for the disease state of
3 diabetes, the simulated biological attribute is substantially consistent with at least one
4 biological attribute associated with a reference pattern of diabetes.

1 9. The computer model of claim 7, wherein the instructions further define a set of
2 defects associated with diabetes, the set of defects including a first defect and a second
3 defect, the first defect is a modification of a first biological process from the set of
4 biological processes, the first biological process is related to biological attributes of
5 diabetes in a reference pattern of diabetes, the second defect is a modification of the first
6 biological process or a second biological process from the set of biological processes, the
7 second biological process is related to biological attributes of diabetes in the reference
8 pattern of diabetes.

1 10. A computer executable software code, comprising:
2 code to define a normal biological state through a set of biological processes, each
3 biological process from the set of biological processes having its own associated
4 parameter set, the set of biological processes being related to glucose metabolism in the
5 context of multiple macronutrient metabolism;

6 code to provide a plurality of predefined defect indicators, each predefined defect
7 indicator from the plurality of predefined defect indicators being uniquely associated with
8 a defect from a plurality of defects associated with a disease state of diabetes, each defect
9 from the plurality of defects being associated with at least one biological process from the
10 set of biological processes; and

11 code to receive a user-specified identification of a first defect indicator from the
12 plurality of predefined defect indicators, a first defect from the plurality of defects being
13 associated with the first defect indicator, the parameter set associated with each biological
14 processes that is associated with the first defect being changed based on the user-specified
15 identification.

1 11. The computer executable software code of claim 10, further comprising:
2 code to determine at least one simulated biological attribute based on the modified
3 biological process associated with the first defect, the simulated biological attribute being
4 substantially consistent with at least one corresponding biological attribute associated with
5 diabetes in a reference pattern of diabetes.

1 12. The computer executable software code of claim 10, further comprising:
2 code to receive a user-specified identification of a second defect indicator from the
3 plurality of predefined defect indicators, a second defect from the plurality of defects
4 being associated with the second defect indicator, the parameter set associated with each
5 biological processes that is associated with the second defect being changed based on the
6 user-specified identification.

1 13. The computer executable software code of claim 12, wherein:
2 the first defect has an associated severity based on the change to the at least one
3 associated parameter set; and
4 the second defect has an associated severity based on the change to the at least one
5 associated parameter set, the severity associated with the first defect being different from
6 the severity associated with the second defect.

1 14. The computer executable software code of claim 12, wherein:
2 the first defect has an associated severity based on the change to the at least one
3 associated parameter set; and
4 the second defect has an associated severity based on the change to the at least one
5 associated parameter set, the severity associated with the first defect being substantially
6 similar to the severity associated with the second defect.

1 15. The computer executable software code of claim 10, further comprising:
2 code to produce a simulated biological attribute based on the parameter set
3 associated with each biological processes that is associated with the first defect, the
4 simulated biological attribute being substantially consistent with biological attributes of a
5 reference pattern of diabetes.

1 16. A computer executable software code, comprising:
2 code to provide a plurality of predefined defect indicators, each predefined defect
3 indicator from the plurality of predefined defect indicators being uniquely associated with
4 a defect from a plurality of defects associated with a disease state, each defect from the
5 plurality of defects being associated with at least one biological process from a set of
6 biological processes, the set of biological processes being related to glucose metabolism in
7 the context of multiple macronutrient metabolism;
8 code to receive a user-specified identification of a first defect indicator from the
9 plurality of predefined defect indicators, a first defect from the plurality of defects being
10 associated with the first defect indicator, the first defect being associated with at least one
11 biological process and its associated parameter set, the at least one parameter set
12 associated with the first defect being changed based on the user-specified identification;
13 and
14 code to receive a user-specified identification of a second defect indicator from the
15 plurality of predefined defect indicators, a second defect from the plurality of defects
16 being associated with the second defect indicator, the second defect being associated with
17 at least one biological process and its associated parameter set, the at least one parameter
18 set associated with the second defect being changed based on the user-specified
19 identification.

1 17. The computer executable software code of claim 16, wherein:
2 the first defect having an associated severity based on the change to the at least one
3 associated parameter set, the second defect having an associated severity based on the
4 change to the at least one associated parameter set, the severity associated with the first
5 defect being different from the severity associated with the second defect.

1 18. The computer executable software code of claim 16, further comprising:
2 code to define a normal biological state through the set of biological processes,
3 each biological process from the set of biological processes being associated with its own
4 parameter set.

1 19. The computer executable software code of claim 16, wherein the plurality of
2 defects are associated with type 2 diabetes.

1 20. A computer executable software code, comprising:
2 code to define a plurality of biological processes related to a disease state of
3 diabetes including:
4 code to define a set of mathematical relations associated with a first
5 biological process from the plurality of biological processes and associated with
6 interactions among biological variables associated with the first biological process,
7 and
8 code to define a set of mathematical relations associated with a second
9 biological process from the plurality of biological processes and associated with
10 interactions among biological variables associated with the second biological
11 process,
12 a first biological process from the plurality of biological processes being associated with
13 metabolism of at least two from the group of carbohydrates, fats and proteins, a second
14 biological process from the plurality of biological processes being associated with
15 metabolism of glucose.

1 21. The computer executable software code of claim 20, further comprising:
2 code to define a set of parametric changes for a first biological process; and
3 code to receive a user-specified identification of a first defect indicator from a
4 plurality of predefined defect indicators, the first defect indicator from the plurality of
5 defect indicators being uniquely associated with a first defect from a plurality of defects
6 that is associated with a disease state of diabetes, the set of parametric changes being
7 changed based on the user-specified identification.

1 22. The computer executable software code of claim 21, further comprising:
2 code to receive a user-specified identification of a second defect indicator from the
3 plurality of predefined defect indicators, the second defect indicator from the plurality of
4 defect indicators being uniquely associated with a second defect from the plurality of

5 defects that is associated with the disease state of diabetes, the second defect being
6 associated with at least one biological process and its associated parameter set, the at least
7 one parameter set associated with the second defect being changed based on the user-
8 specified identification,

9 the first defect having an associated severity based on the change to the at least one
10 associated parameter set, the second defect having an associated severity based on the
11 change to the at least one associated parameter set, the severity associated with the first
12 defect being different from the severity associated with the second defect.

1 23. The computer executable software code of claim 20, further comprising:

2 code to receive a user selection of a link representation from a set of predefined
3 link representations, each predefined link representation in the set of predefined link
4 representations being associated with a different mathematical relationship, the user-
5 selected link representation being associated with the interrelationship between a first
6 biological variable and a second biological variable,

7 a first link representation from the set of predefined link representations being a
8 representation of the first biological variable having an effect on the second biological
9 variable,

10 a second link representation from the set of predefined link representations being a
11 representation of instances of the first biological variable being converted to instances of
12 the second biological variable.

1 24. A method for creating a computer model of diabetes, comprising:

2 receiving a plurality of user-selected indications to define a plurality of biological
3 processes, each biological process from the plurality of biological processes being based
4 on data that relates to changes in biological states to biological attributes of diabetes;

5 producing a representation of the plurality of biological processes based on the
6 user-selected indications, the plurality of biological processes defining at least one portion
7 of the disease state of diabetes;

8 producing a simulated biological attribute associated with at least one biological
9 attribute of diabetes based on the combined plurality of biology processes; and

10 assessing a validity of the computer model based on a comparison between the simulated
11 biological attribute and a corresponding biological attribute associated with a reference
12 pattern of diabetes.

1 25. A method for creating a computer model of diabetes, comprising:
2 identifying data relating to diabetes, the data relating changes in biological states to
3 biological attributes of diabetes;
4 identifying a plurality of biological processes related to the data, the plurality of
5 biological processes defining at least one portion of the disease state of diabetes; and
6 combining the plurality of biological processes to form a simulation of at least one
7 biological attribute of diabetes in the context of fat metabolism.

1 26. A method for creating a computer model of diabetes, comprising:
2 identifying data relating to diabetes, the data relating changes in biological states to
3 biological attributes of diabetes;
4 identifying a plurality of biological processes related to the data, the plurality of
5 biological processes defining at least one portion of the disease state of diabetes; and
6 combining the plurality of biological processes to form a simulation of at least one
7 biological attribute of diabetes in the context of protein metabolism.

1 27. A computer model of a disease state of diabetes, comprising:
2 a computer-readable memory storing:
3 instructions defining a set of biological processes related to the
4 disease state of diabetes, at least two biological processes from the set of
5 biological processes being associated with a set of mathematical
6 relationships related to interactions among biological variables associated
7 with the biological processes, the instructions defining a simulation of at
8 least one biological attribute of diabetes in the context of fat metabolism;
9 and
10 a processor coupled to the computer-readable memory, the processor configured to
11 execute the instructions.

- 1 28. A computer model of a disease state of diabetes, comprising:
2 a computer-readable memory storing:
3 instructions defining a set of biological processes related to the
4 disease state of diabetes, at least two biological processes from the set of
5 biological processes being associated with a set of mathematical
6 relationships related to interactions among biological variables associated
7 with the biological processes, the instructions defining a simulation of at
8 least one biological attribute of diabetes in the context of protein
9 metabolism; and
10 a processor coupled to the computer-readable memory, the processor configured to
11 execute the instructions.